

Yasuji HIRAMATSU -- Serial No. 09/101,833

REMARKS



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Applicant has amended Claims 1, 4-6, 11 and 12. Claims 1-25 remain pending in the present application. Claims 1, 4-7, 10-14, 16, 19-21 and 25 are independent claims. Claims 13-25 are withdrawn from consideration.

Applicant respectfully submits that the amendments to the specification and claims are fully supported by the original disclosure, and that no new matter has been introduced therewith.

In the Office Action dated November 8, 2000, the Examiner rejected Claims 6, 8 and 12 under 35 U.S.C. § 112, second paragraph as being indefinite. Claims 1-4 were rejected under 35 U.S.C. § 102(e) as being allegedly anticipated by Koide et al. (U.S. Patent No. 5,670,067). Claims 5, 6, 11 and 12 were rejected under 35 U.S.C. § 103(a) as being allegedly unpatentable over Mancheryan (U.S. Patent No. 4,979,180) in view of DeRossett, Jr. (U.S. Patent No. 5,298,717). Claims 8/5, 8/6, 9/8/5 and 9/8/6 were rejected under 35 U.S.C. § 103(a) as being allegedly unpatentable over Mancheryan in view of DeRossett, Jr. and Roland et al. (U.S. Patent No. 3,792,287). The indication by the Examiner that Claims 7, 8/7, 9/8/7 and 10 are allowable is noted with appreciation. The cancellation of claims 4, 5, 12 and 13 render moot these rejections with respect to these particular claims.

Reconsideration and allowance in view of the foregoing amendments and the following remarks are respectfully requested.

Claims 6, 8 and 12 were rejected under 35 U.S.C. § 112, second paragraph as being indefinite. Claims 6 and 12 have been amended to fully comply with 35 U.S.C. § 112, second paragraph. Reconsideration and withdrawal of this rejection are respectfully requested.

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Claims 1-4 were rejected under 35 U.S.C. § 102(e) as being allegedly anticipated by Koide et al. This rejection is respectfully traversed.

The present invention a multilayer printed wiring board manufacturing method and apparatus, wherein a position of positioning marks are measured and input processing data is corrected on the basis of the measured positions of the positioning marks, and a laser beam is radiated to a multilayer printed wiring board to eliminate the interlayer resin layer to form a hole for a via hole.

The Examiner states that Koide et al. clearly anticipates Claims 1-4. Koide et al. disclose an apparatus for cutting a wiring on a printed wiring board. Koide et al. fail to teach or reasonably suggest using a laser to form a hole in the insulating interlayer resin layer of a printed wiring board. In order to establish a *prima facie* case of anticipation, the Examiner must show that each and every element of a rejected claim is taught by the cited art. Koide et al. do not teach or reasonably suggest radiating a laser beam "to eliminate the interlayer resin layer to form a hole for a via hole," as required by Claims 1-4. In fact, Koide et al. actually teach away from performing such a task in Col. 12, lines 47-48, where they disclose "favorable cutting of a wire can be achieved without damaging the insulating layer" (emphasis added).

Reconsideration and withdrawal of this rejection is respectfully requested.

Claims 5, 6, 11 and 12 were rejected under 35 U.S.C. § 103(a) as being allegedly unpatentable over Mancheryan in view of DeRossett, Jr. Claims 8/5, 8/6, 9/8/5 and 9/8/6 were rejected under 35 U.S.C. § 103(a) as being allegedly unpatentable over Mancheryan in view of DeRossett, Jr. and Roland et al. These rejections are respectfully traversed.

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Claims 5, 6, 11 and 12 have been amended to set forth that the processing laser source “forms a via hole.” Mancheryan disclose a modular interchangeable laser system.

Mancheryan fail to teach or reasonably suggest using the processing laser source disclosed therein to form a via hole, as required by Claims 4, 5, 8/5, 8/6, 9/8/5, 9/8/6, 11 and 12.

DeRossett, Jr. discloses a method and apparatus for laser inscription of an image on a surface, wherein laser power is controlled to avoid damaging the structural integrity of the glass (abstract). DeRossett, Jr. fails to supplement the deficiencies of Mancheryan because

DeRossett, Jr. fails to teach or reasonably suggest using the processing laser source disclosed therein to form a via hole, as required by Claims 4, 5, 8/5, 8/6, 9/8/5, 9/8/6, 11 and 12.

Roland et al. disclose a non-linear optical crystal and devices which may be used in a harmonic generator, an optical parametric oscillator, an optical frequency upconverter, or other nonlinear optical devices such as an amplifier. Roland et al. fail to supplement the deficiencies of Mancheryan because Roland et al. fail to teach or reasonably suggest using a processing laser source to form a via hole, as required by Claims 4, 5, 8/5, 8/6, 9/8/5, 9/8/6, 11 and 12.

In order to establish a *prima facie* case of obviousness, all of the claimed limitations must be taught or suggested by the prior art, and there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the references or to combine the reference teachings. *In re Vaek*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991). Koide et al., Mancheryan, DeRossett, Jr., and Roland et al. provide no motivation whatsoever to modify the teachings thereof to provide a processing laser source to form a via hole, as required by Claims 4, 5, 8/5, 8/6, 9/8/5, 9/8/6, 11 and 12.

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Reconsideration and withdrawal of these rejections are respectfully requested.

In sum, Applicant respectfully submits that none of Koide et al., Mancheryan, DeRossett, Jr., and Roland et al., nor any combination thereof disclose or suggest the claimed invention and that all of the pending claims are in condition for allowance, which action is respectfully requested.

Attached hereto is a marked-up version of the changes made to the specification and the claims by the current amendment. The attached Appendix is captioned "VERSION WITH MARKINGS TO SHOW CHANGES MADE".

Respectfully submitted,

PILLSBURY WINTHROP LLP

By  REG. NO. 43,385
Glenn J. Perry
Reg. No. 28,458
Tel. No.: (202) 861-3070
Fax No.: (202) 822-0944

GJP/tcs
1100 New York Avenue, N.W.
Ninth Floor
Washington, D.C. 20005-3918
(202) 861-3000

Enclosure: Appendix

APPENDIX

VERSION WITH MARKINGS TO SHOW CHANGES MADE



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1. (Amended) A multilayer printed wiring board manufacturing apparatus, to be used for processing a multilayer printed wiring board having an interlayer resin insulator, comprising:

a processing laser source, a scanning head for deflecting the laser beam in the X-Y directions, a camera for reading the positioning marks of a multilayer printed wiring board, an X-Y table for placing a multilayer printed wiring board, an input section for inputting the processing data of the multilayer printed wiring board, a memory section for storing the processing data or the arithmetic operations result and an arithmetic operating section, wherein

the processing data is input from the input section and this processing data is stored in the memory section;

a position of the positioning mark of the multilayer printed wiring board placed on the X-Y table is measured with the camera;

the input processing data is corrected on the basis of the measured position of the positioning mark to generate the X-Y table drive data in the arithmetic section and this drive data is then stored in the memory section; and

the drive data is read from the memory section and then the X-Y table and the scanning head are controlled in the control section and thereby the laser beam is radiated to the multilayer printed wiring board to eliminate the interlayer resin layer to form [the] a hole for a via hole.

4. (Amended) A multilayer printed wiring board manufacturing method comprising the steps of forming the positioning mark and interlayer insulating agent layer a multilayer printed wiring board;

placing a multilayer printed wiring board having formed said positioning mark on the X-Y table of the multilayer printed wiring board manufacturing apparatus consisting of a processing laser source, a scanning head for deflecting the direction of laser beam in the X-Y directions, a camera for reading the positioning mark of the multilayer printed wiring board, an X-Y table for placing the multilayer printed wiring board, an input section for inputting the processing data of the multilayer printed wiring board, a memory section for storing the processing data or the arithmetic operations result and an arithmetic operating section, and inputting the process log data to this manufacturing apparatus:

measuring the position of the positioning mark of the multilayer printed wiring board with the camera, correcting the input processing data based on the measured positioning mark position to generate the scanning head and the X-Y table drive data in the arithmetic operating section and then storing this drive data in the memory section; and

reading the drive data from the memory section to control the X-Y table and the scanning head in the control section and radiating the laser beam to the multilayer printed wiring board to eliminate the interlayer resin layer to form a hole for a via hole.

5. (Amended) A multilayer printed wiring board manufacturing apparatus comprising a CO₂ laser source, a scanning head for deflecting the direction of laser beam in the X-Y directions or an X-Y table for displacing the position of the multilayer printed wiring board, wherein the laser beam oscillated from said CO₂ laser source is converted to the beam of shortened wavelength by harmonic wave generating means and forms a via hole.

6. (Amended) A multilayer printed wiring board manufacturing apparatus comprising a processing laser source, harmonic wave generating means for converting the laser beam oscillated from said processing laser source to the shortened wavelength beam of second harmonic wave and a scanning head for deflecting the direction of the laser beam in the X-Y directions or an X-Y table for displacing position of the multilayer printed wiring board, wherein the wavelength of said processing laser source is between 720nm [or less] and the minimum wavelength of the laser source [or more], or between 6000nm [or more] and the maximum wavelength of the laser source [or less], and said processing laser source forms a via hole.

11. (Amended) A laser processing apparatus comprising a CO₂ laser source, a scanning head for deflecting the direction of laser beam to the X-Y directions or an X-Y table for displacing the position of a work piece to be processed, wherein the laser beam oscillated from said CO₂ laser source is converted to the shortened wavelength beam by harmonic wave generating means and forms a via hole.

12. (Amended) A laser processing apparatus comprising a processing laser source, harmonic wave generating means for converting the laser beam oscillated from said processing laser source to the shortened wavelength beam of the second harmonic wave, and a scanning head for deflecting the direction of the laser beam to the X-Y directions or an X-Y table for displacing the position of a work piece to be processed, wherein the wavelength of said processing laser source is between 720nm [or less] and the minimum wavelength of the laser source [or more], or between 6000nm [or more] and the maximum wavelength of the laser source [or less], and said processing laser source forms a via hole.